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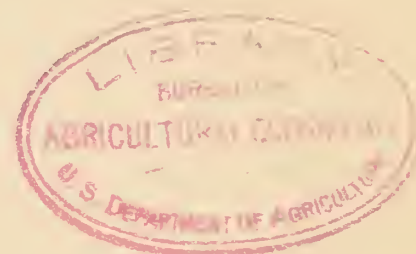
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GRAIN INSPECTORS' MANUAL



Separate on the Sampling of
Grain for Inspection and Grading

Washington, D. C.
July, 1940

The Grain Inspectors' Manual was issued by the Bureau of Agricultural Economics in June 1938 when the work on grain inspection and grading was a part of that bureau. In July 1939 the work was transferred to the Agricultural Marketing Service.

In this reprint, the words "Chief of the Agricultural Marketing Service" should be substituted for the words "Chief of the Bureau of Agricultural Economics" on page 2.

CHAPTER I

THE SAMPLING OF GRAIN FOR INSPECTION AND GRADING

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The taking of a correct and representative sample of a lot or parcel of grain for inspection and grading purposes is an important and essential part of grain inspection. If the sample obtained is not representative no amount of care in making the determinations for the grading factors will establish the true grade of the grain involved. The Department of Agriculture, in its administration of the Grain Standards Act, holds that the licensed inspector is responsible for the correctness of the sample upon which he bases the grade of any lot or parcel of grain. For correct grading it is essential that the sample, properly identified, be preserved in its original condition from the time it is taken until the grade is determined and that it be of sufficient size to permit the required tests to be performed.

INSPECTION
AND GRADING
DEFINED
(1)

An inspection and grading of a lot or parcel of grain tendered for inspection and grading under the Grain Standards Act shall consist of taking and examining a representative sample or samples thereof, and making such tests as are necessary to determine its grade. For each inspection and grading a certificate of grade shall be issued according to Regulation 2 of the Regulations of the Secretary of Agriculture under the U. S. Grain Standards Act. Regulation 2 also provides in part that:

Representative
Sample
(2)

"No licensed inspector shall issue a certificate of grade for any grain unless the inspection and grading thereof be based upon a correct and representative sample of the grain. No sample shall be deemed to be representative unless of the size, and procured in accordance with the methods, prescribed in instructions issued by the Chief of the Bureau of Agricultural Economics or by such officer of the Department as may be designated by him for the purpose, which are in effect at the time of the inspection and grading."

* * *

In accordance with this regulation the following instructions shall be effective until further notice.

The size of the sample shall be not less than approximately two quarts. If the time to elapse between the drawing of the sample and the determination of the grade would permit of such changes in the condition of the sample as to affect the grade of the lot or parcel from which the sample was taken, the sample shall be enclosed in a moisture-proof container.

* * *

Samples of
Carlots, and
Truck Lots
(3)

In the case of bulk grain in carload lots, trucks, or wagon lots, or in any other container in which the grain is of about the same depth as in a carload, the sample shall be taken with a double-tube compartment trier 60 inches long by probing flaxseed in seven or more places and all other kinds of grain in five or more places, well distributed in different parts of the car, truck, or other

container. In the discretion of the sampler, and/or inspector, as many more probings as may be necessary shall be taken from the grain in different parts of the lot.

Where only five probings are made in sampling carlots of bulk grain, approximately the following procedure for probing the grain shall be observed:

- (1) Probe in center of the car.
- (2) Probe from 2 to 4 feet back from the doorpost toward the end of car and approximately 2 feet out from one side of the car.
- (3) Probe from 2 to 4 feet from same end of the car and approximately 2 feet from the opposite side of the car as in Probe (2).
- (4) and (5) Probe same as in Probes (2) and (3) in opposite ends and sides of the car.

Method of
probing
carlots
(4)

Insert the probe or trier in the grain at an angle of about 10 degrees from the vertical, with the slots closed.

The slots shall be faced up when opened and while slots remain open give the probe about two slight up and down motions so that all of the openings may be filled, close slots and withdraw the probe, placing each probing full length on a sampling cloth.

Examine each probing for uneven loading in respect to class, smut, odor, moisture content, whether hot or heating, infested with live weevils or other insects, including *Angoumois moth, or any other factor that would likely be more noticeable and apparent within the car than in the sample after it leaves the car and that would tend to affect the grade.

Examination
of probings
(5)

*If a considerable number of Angoumois moths are noted flying around top of grain in the car this fact should be specifically reported.

The standards require that grain which is heating or hot shall grade Sample grade. This determination is based on evidence secured and recorded at the time of sampling.

Heating
or hot
(6)

When high temperatures develop in grain as the result of fermentation, such grain is called "heating" or "hot." Heating or hot grain usually gives off a sour or musty odor that indicates fermentation some place within the mass of grain.

Care should be exercised never to confuse grain that is heating from fermentation with sound grain that has become warm due to storage in bins, cars, or other containers during hot weather.

Sample Ticket
(7)

Record observations of points in preceding paragraphs on the sample ticket or record which accompanies the sample.

The sample ticket or record shall bear the sampler's initials or name and must remain in the sample until the sample has been inspected and the inspection duly recorded.

In the case of heavily loaded cars of bulk grain or carloads of sacked grain in which only a "door-probe sample", "shallow-probe sample", "door-sack sample", or "interior surface sample" can be taken, such fact shall be noted on the sampler's ticket or record. (See Reg. 2, Sec. 31, re heavily loaded cars.)

Additional
Samples
(8)

After a sample of the entire lot has been taken and an examination of the different probings thereof indicates that the lot is composed of material portions of grain of distinctly different kind, quality, or condition, a representative sample shall be taken from each different portion of the lot, in addition to the average sample, and the quantity of grain which is represented by each sample shall be estimated in fractional parts of the entire lot and its location in the container shall be recorded on the sampler's ticket or record. When additional and separate samples are taken representing different portions, the portions of the load from which separate samples are taken shall be estimated and stated in fractional parts of the entire load as $1/5$, $1/10$, $1/20$, $3/4$, $19/20$, $9/10$, $4/5$, etc., as the case may be, together with the quantity and the location of the different portions in respect to the whole carlot.

In the foregoing instructions it will not be necessary to take two or more samples from any car unless there is an apparent outstanding difference as to kind, class, quality, or condition, or unless excessive foreign material or dockage material is present in parts of the car.

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CARGO GRAIN

No inspection shall be made of any grain which is to be loaded into a boat, barge, or other vessel if it appears that said container is in such condition as to lower the grade of such grain. (Reg. 2, Sec. 24.)

Examination of
Vessel Holds
for Condition
(9)

In the case of bulk grain being loaded for inspection and grading aboard a boat, barge, or other vessel, the sample shall be taken from the loading spout, or other convenient place en route, by the use of a device known as "The Pelican spout sampler" or any other device giving equivalent results. The stream or streams shall be sampled at regular and frequent intervals to assure a correct and representative sample of the lot.

Representative
Samples of
Cargo Grain
during Loading
(10)

The first drafts aboard the vessel shall be considered indicative of the class and/or subclass and grade of the lot to be tendered for the purpose of determining the uniformity of grade, quality, and condition.

First Samples
Establish
Grade for which
Tendered
(11)

Each separate sample taken from the stream or streams must be examined for quality and condition and compared with preceding samples before being added to the final or composite sample.

Each Sample
Compared with
Previous Sample
(12)

Each sample taken from the stream or streams, which apparently is of a lower grade (including dockage) than the grade for which the lot is being tendered, must be kept separate and these facts shall be reported at once, as a matter of information, to the interested parties and the grain supervisor.

Reporting
Sample
Variation
(13)

A record of such report should be entered in a suitable book or loading chart, showing:

Record of
Reports to
Interested
Parties
(14)

- (a) To whom the facts were reported;
- (b) Time parties were notified;
- (c) Estimated quantity covered by such sample or samples; and
- (d) What action, if any, taken by parties at interest.

When the inspector has ascertained the grade for which the lot is being tendered, as provided in item 11, interested parties should realize that the loading of grain of lower grade (including dockage) will result in separate certification if such grain is permitted to remain in the vessel. (Reg. 2, Sec. 36.) This same principle applies to weevily grain, unless such grain is treated in a manner satisfactory to the inspector or the supervisor before loading is resumed.

Methods of
Retaining,
Compositing,
and Separating
Samples
(15)

Samples which represent quantities of grain of lower grade (including dockage) than the grade of the grain originally tendered or declared, shall not be composited with the average sample representing the remainder of the loading.

When the loading of each lot tendered for inspection has been completed, and if all samples are uniform as to grade, quality, and condition, they shall be composited as one sample representative of the lot.

If all samples are not uniform as to grade (including dockage) then those representing the grain of lower grade shall be kept separate from the remaining samples.

Samples representing each layer or stratum of grain shall be composited together in accordance with its grade (including dockage) and the estimated quantity represented by each such composite sample shall be shown on the sample ticket.

Samples of
Night Loading
(16)

When lots of grain are being loaded at night, or when loading starts in the daytime and finishes during the night, a separate sample of each load (approximately 8,000 bushels) which is loaded during the hours of darkness shall be kept separate for examination under conditions which will permit the determination of the true grade.

* * *

Representa-
tive Samples
of Cargo and
Barge Unload-
ing (17)

In the case of grain tendered for inspection as it is being discharged from a boat, barge, or other vessel, the sample shall be taken from the running stream or at some other convenient place after it leaves the vessel and before its identity is lost, provided the sample is not taken from grain moving on a horizontal belt where a cut of a full cross-section of the stream is impracticable. The sample or samples shall be taken in such a manner that it will be a correct and representative sample of the lot.

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If the grain is unloaded in such a manner that it can be sampled with a "Pelican" or other device giving similar results, follow the same procedure as that given for sampling grain being loaded aboard vessels. Care should be exercised never to confuse grain, that is heating from fermentation, with sound grain that has become warm in stowage in vessels due to external conditions such as engine room heat, etc.

Pelican
Sampling
(18)

In the event that the method prescribed in the preceding paragraph is impracticable because of local physical conditions, the samples may be taken in the most practicable manner that will assure their being representative of the lot tendered for inspection, provided the method to be used has been approved by the supervisor in charge of the district in which the grain is located.

Other Approved
Methods of
Sampling
(19)

* * *

In the case of a lot of bulk grain tendered for inspection as it lies in a boat, barge, or other vessel, samples shall be taken with a double-tube compartment grain trier of either standard or special length by probing at regularly spaced intervals throughout the entire lot, provided that all of the grain so tendered is accessible for proper sampling. If the lot of grain tendered for inspection is of such depth or stowed in such a manner that representative samples of the entire lot cannot be obtained by the sampling methods prescribed in this paragraph, the grain shall be considered as inaccessible for sampling within the vessel.

Representative
Sample of Cargo
or Barge Grain
at Rest in the
Vessel
(20)

In circumstances where (1) all of the grain in a boat, barge, or other vessel is tendered for inspection, (2) the vessel is divided into compartments and (3) all of such grain is accessible for sampling with a standard or special length grain trier, the grain in each compartment shall be probed not less than five times with the probes equally spaced throughout each of the several compartments. If the barge is not divided into compartments, 20,000-bushel capacity barges shall be probed not less than 20 times, evenly spaced throughout the load; 60,000-bushel capacity barges shall be probed not less than 30 times, evenly spaced throughout the load and in proportion for other vessels of varying types or capacities, with the added proviso that as many more probings may be taken as are necessary to assure representative samples being secured.

Sampling Grain
in Vessel with
Probe when all
the Grain is
Accessible
(21)

Method of
Probing
(22)

Insert the probe or trier in the grain at an angle of 10 degrees from the vertical, with the slots closed. The slots shall be faced up when opened and while the slots remain open give the probe about two slight up and down motions so that all of the openings may be filled, close the slots and withdraw the probe, placing the contents of the probe full length on the sampling cloth.

Examination
of Probings
(23)

Examine each probing for uneven loading with respect to grade, quality, or condition.

Compositing
the Sample
(24)

If all probings are found to be uniform with respect to grade, quality, or condition, they shall be composited as one sample.

If all probings are not found to be uniform with respect to grade, quality, or condition by reason of the presence of a material portion of grain of different grade, quality, or condition, separate samples shall be taken from such portion and from the remaining portion of the lot and the quantity of grain which is represented by each sample shall be stated in terms of compartments or approximate number of bushels, as the case may require, together with its location in the boat, barge, or other vessel, and shall be shown on the sample ticket.

* * *

Representa-
tive Samples
of Bulk Grain
in Bins
(25)

In the case of bulk grain in bins of elevators and warehouses where (1) the depth of grain is so great as not to permit thorough probing with a trier of either standard or special length, or (2) where accessibility or other conditions make it hazardous for a person to enter the bin, the sample or samples shall be taken from a running stream of grain pouring into or from such bin. Samples from the running stream shall be taken with a device known as "The Pelican spout sampler" or with a pan or any other device giving equivalent results, which device shall be so handled as to cut across the running stream at regular and frequent intervals and in such a manner as to obtain a representative portion of the entire lot.

* * *

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In the case of sacked grain the samples shall be taken from the sacks by any standard or approved grain trier of sufficient length to reach to the center of the sacks.

Representa-
tive Samples
of Sacked
Grain
(26)

Samples shall be drawn from as many individual sacks, selected at random through the lot, as will enable the sampler to procure a representative sample of the entire lot.

Method of
Taking Samples
(27)

* * *

Item 7 gives instructions as to the manner in which samples of sacked grain in carlots shall be identified.

Identifica-
tion of
Samples
(28)

In the case of sacked grain in piles on docks, platforms or warehouses in which all of the sacks are not accessible for sampling, samples shall be drawn from as many individual sacks, selected at random from the exposed sacks on top, sides and ends of the lot as will enable the sampler to secure a representative sample of all of the exposed sacks. Notations should then be made on the sampler's ticket to the effect that the sample represents only the exposed number of sacks in a pile of a total number of sacks, illustrated as follows:

3,000 sacks in a pile
500 " only exposed for sampling

Sampler's ticket should read: "Sample represents 500 sacks only, balance of sacks inaccessible for sampling, total sacks in pile 3,000 (approximately if exact amount not known)."

* * *

The sample ticket used by the sampler should provide spaces for full identification of the lot sampled and for any additional information secured at time of sampling. The ticket should also provide spaces for the inspector's findings when grading the sample. It is desirable that these tickets be printed in duplicate so that one copy may be filed with the sample and one copy may be used by the clerk who prepares the certificate.

Form of
Sample
Ticket
(29)

* * *

The sample ticket form shown below (usually prepared in duplicate) is suggested for use by licensed grain inspectors."

Number	:	(Name of Inspection Department)	:	Date
	:		:	
Amt. Carload	:		:	Location
	:	Consignee	:	
Initial	:	Car No.	:	
	:		:	
	:		:	Dockage
	:		:	
Grade	:		:	
Test Weight	:	Moisture	:	Total
per bu.	:	Content	:	Damaged
	:		:	Heat
	:		:	Foreign
	:		:	Material
	:		:	
	:		:	
	:		:	
Remarks				
Seals			Inspector	
			Sampler	

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CHAPTER. II

BASIS OF GRADING

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The basis of inspection and grading for commercial lots of grain is governed by instructions which are summarized as follows:

In the case of carlots of grain which are generally or reasonably uniform in quality and condition throughout the car, the normal procedure should be followed of treating all the grain as one unit for inspection and grading, and of basing the grade on a representative sample resulting from a composite of the probings or triers full from different parts of the car.

Grading Car-
lots of Uni-
form Quality
(50)

In the case of carlots of grain which are not generally uniform as to quality or condition, care must be exercised, in basing the grade, to insure that the grade assigned will reflect as nearly as may be the quality of the entire lot of grain. In cases where the variations in quality or condition are not material, the grade shall be properly based upon a composite sample of all the probings from different parts of the car.

Grading Car-
lots of non-
uniform
Quality
(51)

In the case of cars unevenly loaded in respect to quality or condition, where the variation in quality or condition is marked by a distinct and outstanding difference between one portion of the carlot and another, one grade will not reflect the quality of the entire lot. In the latter case each such portion, distinctly and outstandingly different from the other portion or portions, will be regarded as if it were a separate lot or unit for inspection and grading, so that the grade of the different portions will be based upon samples representing such portions. Unevenly loaded cars wherein a portion of the carlot is widely different from another in respect to odor, moisture, damaged, heat damaged, layers or pockets of screenings,

foreign material, and dockage, illustrate the kind of cases where such a dual grading will afford a better description of the quality and condition of a carlot of grain than if an attempt were made to base the grade on one composite sample.

Basis for
Compositing
or not
Compositing
Samples
(52)

The determination whether to composite the probings and grade the carlot as a unit or to grade separately portions of distinctly different quality or condition must be on the basis of the grading factors and the quantities of grain which are involved in the different portions of a non-uniform lot. Moderate differences in weight per bushel, color, moisture content, damaged grains, heat-damaged grains, dockage, foreign material, and smut, illustrate the kind of cases in which the compositing of all triers full, taken from different portions of the car, will properly form the basis of a fair grade on the entire lot. If factors which indicate an unsound condition such as, for example, heating, hot, musty, sour, and commercially objectionable foreign odor, are in evidence throughout the carlot, and in a general or widespread manner, the entire lot should be graded accordingly. If a material quantity of grain that is out of condition is located in a single definite place or area in the carlot of grain, the sample representing such out of condition portion should not be composited with the sample representing the remainder of the carlot but should be graded separately. However, if a carlot of otherwise sound grain contains a small spot of grain that is out of condition, the sample from such small spot should not be graded separately, unless the condition of the carlot as a whole is indicative of incipient deterioration.

In the last analysis the determination whether to grade the carlot as a unit or to adopt the dual grading must rest in the exercise of good judgment by the inspector. Such judgment on the part of the inspector is essential to the determination of whether one grade (including dockage) on the entire lot fairly reflects the quality and the condition of the grain in the car. In numerous cases the dual certification procedure herein provided for affords opportunity to render service to the industry and enables the inspector to recite on his certificate the facts and circumstances surrounding the carlot of grain as it is tendered to him for inspection.

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Whenever more than one grade (including dockage) is determined on the basis of separate samples, both grades should appear on the grade certificate, together with the estimate of the quantity of grain of each grade, its position in the car, and the required grading factors applicable to such portion.

Certification
of Non-uniform
Carlots
(53)

* * *

In the inspection and grading of lots, parcels, and cargoes of grain loaded aboard boats, barges, and other vessels, licensed inspectors shall be governed by the following requirements:

Cargo Lots
(54)

1. If such a lot, parcel, or cargo tendered for inspection and grading be uniform in quality and condition, the grade (including dockage), shall be based upon an average sample thereof;

Grading Cargo
Lots of Uni-
form Quality
(55)

2. If such lot, parcel, or cargo so tendered is not uniform in quality and condition by reason of the presence therein of a material portion of grain of a different grade (including dockage), the licensed inspector shall consider the portions of such lot, parcel, or cargo which are of different grades (including dockage) as separate lots tendered for inspection, and shall separately inspect, grade, and certificate as to grade such different portions; and each such certificate of grade shall bear a statement to the effect that the grain to which it applies has been loaded on board with other grain, the grade, description, and approximate quantity of which shall be specified.

Grading Cargo
Lots of Non-
uniform Quality
(56)

